Express Mail Label No. EU800953397US

Color-Coded Cleaning Nozzles and Method of Cleaning

Field of the Invention

[0001] The present invention relates to an apparatus and method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. In particular, the invention relates to a plurality of color-coded cleaning nozzles, which are interchanged with a common vacuum cleaner and which are designated for use only in a particular area.

Background of the Invention

[0002] Industrial vacuum cleaners having a plurality of interchangeable cleaning nozzles are known in the prior art. For example, the intermittent duty and continuous duty vacuum cleaners sold by Nilfisk-Advance America, Malvern, Pennsylvania, are provided with various floor nozzles, pipe brushes, crevice tools, etc., which interchangeably connect to the hose/wand of the vacuum cleaner. In many cases, the same vacuum cleaner and attachments are used throughout a facility to clean separate and/or distinct areas. As a result of using the same vacuum cleaner and attachments throughout the entire facility, debris collected in one area may be introduced into, and thus contaminate, another area. In many industries, such as the food or pharmaceutical industry, even trace amounts of cross-contamination, can adversely affect product quality. Therefore, it is desirable to provide a method and apparatus for preventing cross-

contamination between different areas while cleaning the areas with a common vacuum cleaner.

Summary of the Invention

[0003] The present invention provides a set of color-coded cleaning nozzles, which are interchanged with a common vacuum cleaner and which are designated for use only in a particular area. Each nozzle includes a base having a top surface, bottom surface and peripheral surface. An agitation skirt is mechanically fastened to the peripheral surface of the base. The agitation skirt may comprise an elastomeric strip having a plurality of serrations, or plurality of bristles.

[0004] A concavity is formed in the bottom surface of the base. An aperture extends through the base from the top surface to the concavity. An articulated connector is mechanically fastened to the top surface of the base. Visual identifying indicia are provided on each nozzle to uniquely identify each nozzle.

[0005] Preferably, the identifying indicia comprise a plurality of different colors. For example, the base of each nozzle is made of a differently-colored polymeric material.

[0006] The nozzles are preferably constructed of materials approved by the FDA for contact with human food and can be sterilized in an autoclave. It is also preferable that the nozzles be made of a material that can be sterilized in a COP tank in a solution selected from the group consisting of hot water or steam; halogen sanitizers; quaternary ammonium compounds; high and low ph sanitizers; and detergent sanitizers.

[0007] The invention also provides a method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. A plurality of cleaning nozzles are provided that are interchangeable with the vacuum cleaner. Visual identifying indicia are applied on each of the nozzles to uniquely identify each nozzle. A particular nozzle is assigned to each distinct area of the facility. A first area of the facility is cleaned with its assigned nozzle. A second area of the facility is then cleaned only after removing the first nozzle from the vacuum cleaner and replacing it with the nozzle assigned to the second area. Each of the nozzles is isolated from one another to prevent cross-contamination.

[0008] The identifying indicia are preferably provided on the same location of each nozzle, such as the external surface of the nozzles. The method includes the step of preventing removal of the identifying indicia from the nozzle during sterilization or daily use bu, for example, fabricating the base of each nozzle from a differently-colored polymeric material. The nozzles are periodically sterilized in an autoclave or by washing and submersion in a COP tank.

Brief Description of the Drawings

[0009] Fig. 1 is a perspective view of a cleaning nozzle in accordance with an embodiment of the invention;

[0010] Fig. 2 is a perspective view of a cleaning nozzle in accordance with a further embodiment of the invention;

[0011] Fig. 3 is a fragmentary, perspective view of a cleaning nozzle in accordance with another embodiment of the invention; and,

[0012] Fig. 4 is a fragmentary, perspective of each nozzle of a color-coded set of nozzles in accordance with an embodiment of the invention.

Detailed Description of Preferred Embodiments

[0013] The apparatus and method of the present invention are described below with reference to Figs. 1-4, wherein like reference numerals are used throughout to designate like elements.

[0014] A first embodiment of a nozzle in accordance with the invention is shown in Fig. 1 and is designated generally by reference numeral 10. The nozzle 10 has an elongate base 12 having a top surface 14, a peripheral surface 16 extending around the periphery of the base 12, and a bottom surface 18. An elongate, irregularly-shaped concavity 20 is formed in the bottom surface 18. The shape of the concavity 20 generally compliments the shape of the base 12 and extends along the length of the base 12. A central aperture 22 extends through the base 12 from the concavity 20 to the top surface 14.

[0015] An agitation skirt 24 is fixed to the peripheral surface 16 and extends around the entire base 12. The agitation skirt 24 contacts and loosens dirt clinging to the surface to be cleaned. In the embodiment shown in Fig. 1, the skirt 24 comprises a strip of polymeric material. The strip is fixed along one lengthwise edge 24a to the base 12 with a plurality of equally-spaced fasteners 26. In the preferred embodiment, the fasteners 26

comprise staples. However, other types of mechanical fasteners such as screws, pins, nails, etc. can be used. The strip has a plurality of serrations 28 equally-spaced along the other lengthwise edge 24b. The serrations 28 enhance vacuum air flow through the skirt 24 and allow the skirt 24 to deform locally around obstructions on the surface to be cleaned.

[0016] To prevent the skirt 24 from collapsing under vacuum pressure and blocking air flow through the central aperture 22, a U-shaped support member 50 is mounted on the bottom of the base 12. In the embodiment shown in Fig. 1, the support member 50 straddles the central aperture 22.

[0017] Referring to Fig. 1, an articulated connector 30 is fixed to the top surface 14 of the base 12 and is aligned with the central aperture 22. The connector 30 has a mounting base plate 32, which is preferably mechanically fastened by screws to the top surface 14 of the base 12. The connector 30 includes a pair of hinges 34, each of which is connected at one end 34a to the mounting base plate 32 and at the other end 34b to opposite sides of a connection sleeve 40. Each hinge 34 preferably comprises a pair of pivotally-connected, irregularly-shaped leaves 36a, 36b. Preferably, on at least one of the hinges 34, the pivotal connection can be locked in infinite positions. In the embodiment shown in Fig. 1, the leaves 36a, 36b are connected by a thumbscrew 38 having a knurled head. The hinge 34 can be locked in position simply by tightening the thumbscrew 38.

[0018] The connection sleeve 40 comprises a curved tube segment 42, a compression ring 44 at one end of the segment 42, and a flexible rubber sleeve 46 at the other end of the segment 42. The compression ring 44 removably locks the connection sleeve 40 to

tubular wands 48 of various lengths. The rubber sleeve 40 seals and connects the tube segment 42 to the central aperture 22 in the base 12.

[0019] In an alternative embodiment of the nozzle 110 shown in Fig. 2, the base 112 is curved instead of flat. This embodiment of the nozzle110 is adapted for use in cleaning pipes and other curved surfaces. The nozzle 110 can be provided in a variety of curvatures to accommodate different pipe sizes. Otherwise, the nozzle 110 has the same construction as the nozzle 10 shown in Fig. 1. All elements of the nozzle 110 that are identical to the nozzle 10 shown in fig. 1 are identified with counterpart reference numerals plus 100.

[0020] In an alternative embodiment of the nozzle 210 shown in Fig. 3, the agitation skirt 224 comprises a curtain of cleaning bristles 229, which are fixed to the peripheral surface 216 of the base 212. The bristles 229 are interconnected by a base strip 231, which is fixed to the peripheral surface 216 of the base 212 by plurality of mechanical fasteners 226. In the embodiment shown in Fig. 3, the mechanical fasteners comprise staples; however, other types of mechanical fasteners such as described above can be used. Otherwise, the nozzle 210 shown in Fig. 3 has the same construction as the nozzle 10 shown in Fig. 1. All elements of the nozzle 210 that are identical to the nozzle 10 shown in Fig. 1 are identified with counterpart reference numerals added to 200.

[0021] In each of the embodiments described above, the nozzles 10, 110, 210 are preferably constructed of materials approved by the FDA for contact with food so that the nozzles can be used in food processing facilities, particularly those facilities concerned with allergen control. In particular, the materials should comply with FDA guidelines set

forth in 21 C.F.R. § 1 et seq. Further, as described below, the pigments used to color the nozzle base copolymer should also be approved for coloring of plastics to be applied in contact with food.

[0022] The nozzles 10, 110, 210 are also preferably made of materials and assembled in a manner such that the nozzle 10, 110, 210 can be sterilized in an autoclave. It is also preferred that the nozzles be manufactured from non-corrosive materials so that the nozzles can be washed down and submersed in clean out of place (COP) tanks using one or more of the following cleaning solutions: hot water or steam; halogen sanitizers; quaternary ammonium compounds (QUATS); high and low ph sanitizers; and, detergent sanitizers. Therefore, mechanical fasteners, not adhesives, are recommended to assemble the nozzle. In the preferred embodiment, the nozzle base is made of FDA approved copolymer polypropylene. The agitation skirt 24, 124 and rubber sleeve 46, 146 are made of FDA approved silicon rubber. The hinges 34, tube segment 42, compression ring, and mechanical fasteners are made of stainless steel or aluminum.

[0023] In the preferred embodiment, a plurality of nozzles 10 is provided as a set 300 as shown in Fig. 4. Within the set 300, each nozzle 10 has a different color or has other identifying indicia applied thereto to visually distinguish one nozzle from another. Referring to Fig. 4, an-enlarged portion of the base of each nozzle 110a, 110b, 110c of a three-nozzle set 300 is shown in which each nozzle 110a, 110b, 110c has identifying indicia applied to the base 112a, 112b, 112c of the nozzle. The unique identifying indicia, which may comprise colors, letters, numbers, symbols or the like, are represented in Fig. 4 by different geometric shapes.

[0024] The identifying indicia preferably comprise a plurality of colors. In the preferred embodiment, the base 112 of each nozzle 110a, 110b, 110c is made from a copolymer, which is blended with a different color pigment. For example, the bases 112a, 112b, 112c of the nozzles could be made from copolymers colored red 111, yellow 113 and green 115, respectively. The use of bright colors enables users to easily match each nozzle to a unique application or area of the facility. Because the base is made of a colored polymer, the identifying indicia cannot be mistakenly removed or wear off over time. The bright color also will not be visually obstructed over time by dirt.

[0025] Alternatively, color can be applied to a portion of the nozzle to uniquely identify each nozzle. For example, the top surface of the base of each of the nozzles may be painted with a color that is different than each of the other nozzles. In a further embodiment, each nozzle may be provided with some other type of identifying indicia to visually distinguish one nozzle from another. In each case, it is preferred that the identifying indicia be located at the same location on each nozzle for easy identification.

[0026] The invention also provides a method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. In accordance with the method of the present invention, the color-coded cleaning nozzles are interchanged with a common vacuum cleaner but are used only in a particular assigned area of a facility or for collecting a particular material.

[0027] Each nozzle is interchangeable with the vacuum cleaner and includes unique visual identifying indicia thereon. In the preferred method, the identifying indicia comprise different pigmented copolymers from which each of the nozzle bases are

formed. The user assigns a particular color to each distinct area of the facility or material to be collected. A first area of the facility is cleaned using the colored nozzle assigned to that area. After cleaning is completed in the first area, the user proceeds to a second area of the facility only after removing the nozzle assigned to the first area and replacing it with the nozzle assigned to the second area. To further prevent cross-contamination, the nozzles are isolated from one from one another during storage.

[0028] To further decrease the risk of cross-contamination, the nozzles are periodically sterilized in an autoclave. Alternatively, the nozzles are periodically sterilized by washing and submersion in a COP tank using one or more of the solutions described above. Because the base of the nozzles are made from pigmented copolymer, the color identifying indicia are not removed during repeated sterilization using any of the above-described techniques.

[0029] While the principles of the invention have been described above in connection with specific embodiments, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention